Energy Research and Development Division
INTERIM/FINAL PROJECT REPORT

DAVIS FUTURE RENEWABLE ENERGY AND EFFICIENCY

Appendix E-2

Prepared for: California Energy Commission
Prepared by: Valley Climate Action Center on behalf of the City of Davis, CA

JULY 2015
CEC-500-2016-015-AP-E2

Solar Thermal Deployment Plan

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SOLAR THERMAL MARKETING STRATEGIES

- **What are the Targets Markets?**
- **Features and Benefits**
- **Financial Return Examples**

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Solar Thermal Deployment Plan

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Solar Thermal is....

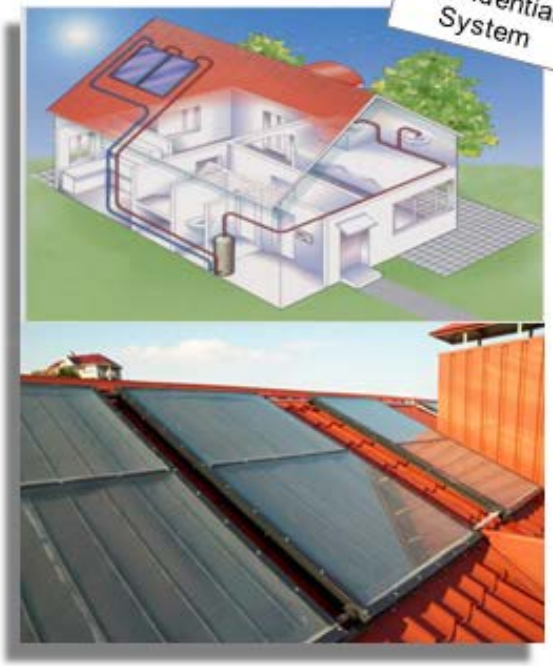
Using the power of the sun to directly heat water, air or a heat-exchanging fluid

Commercial Collectors

Evacuated Tubes

Flat Plate

Residential System



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How It Works.....

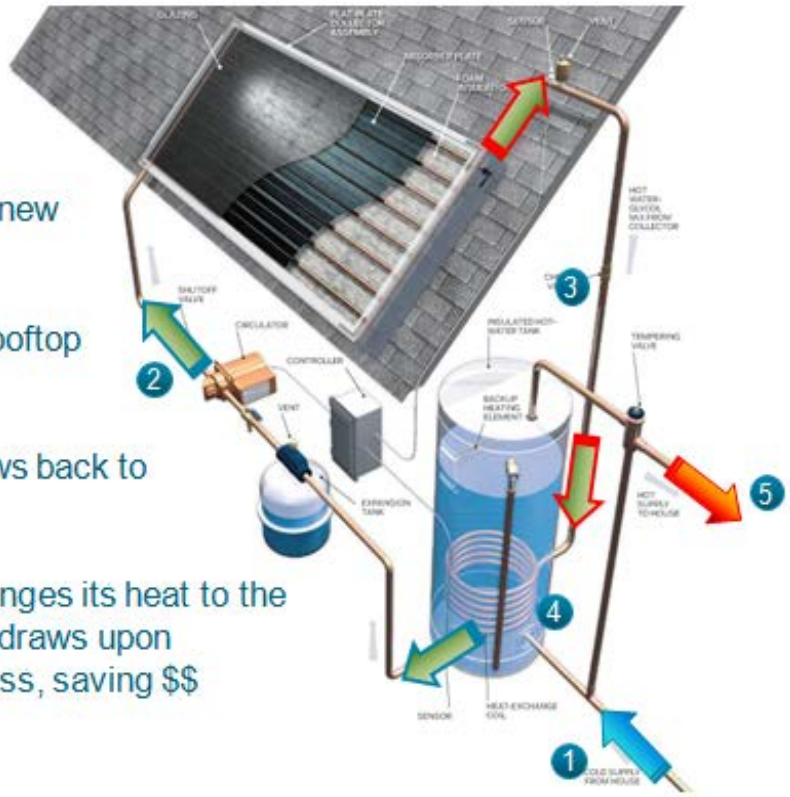
Residence...

Step 1: Cold inlet water enters new storage tank

Step 2: Glycol is pumped the rooftop collectors to be heated by sun

Step 3: Solar-heated glycol flows back to the new insulated storage tank

Step 4 and 5: Hot glycol exchanges its heat to the water, the current water heater draws upon the preheated water, working less, saving $$



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How It Works.....

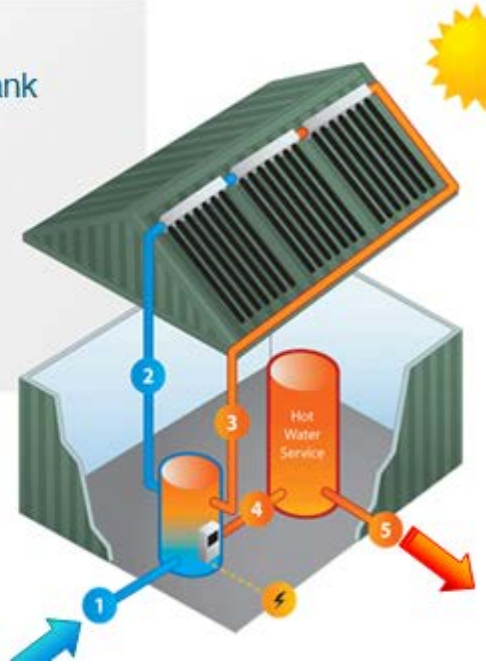
Dairies, food processors, breweries, laundromats, etc.....

Step 1: Cold inlet water enters new storage tank

Step 2: Water is pumped the rooftop collectors to be heated by sun

Step 3: Solar-heated water flows back to the new insulated storage tank

Step 4 and 5: When there is hot water demand, the current water heater draws upon the preheated water, working less, saving $$



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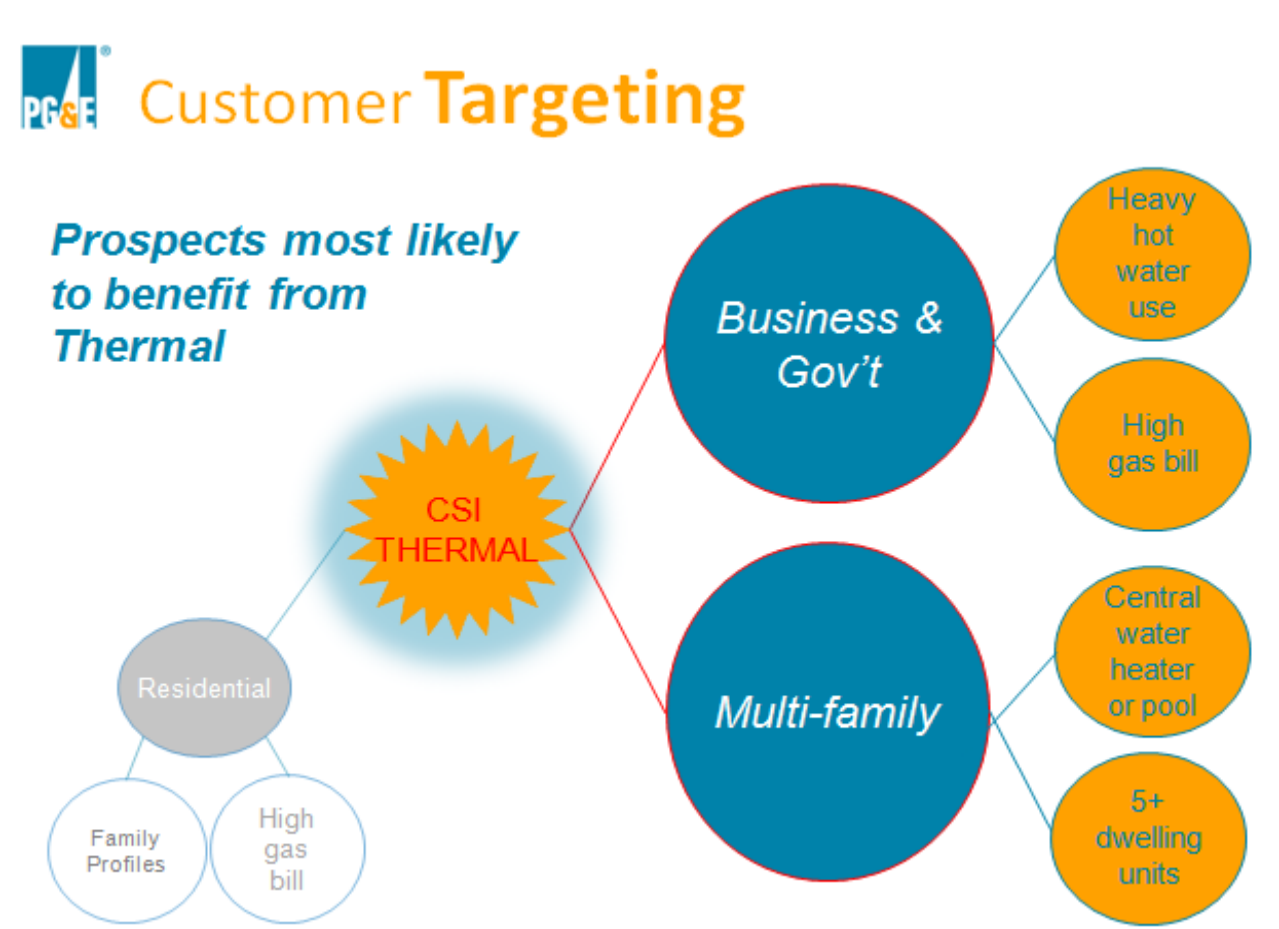

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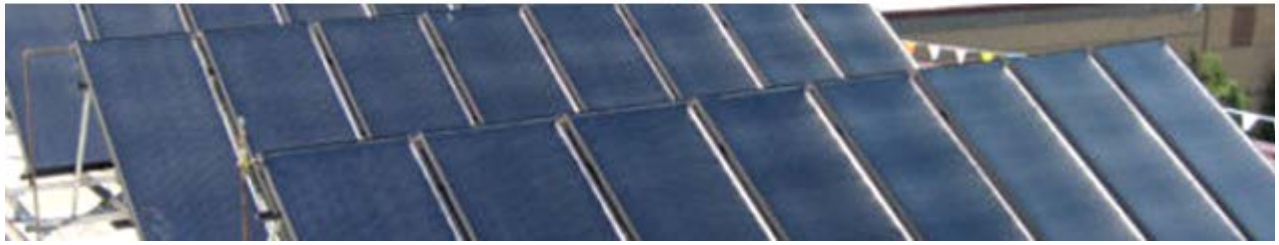
Who can benefit?

Ideal Profiles

- ✓ High hot water use
- ✓ Consistent water use
- ✓ Temps ~120 – 180 F
- ✓ Avail roof and/or ground space
- ✓ Company with green initiatives
- ✓ LARGE ENERGY COSTS

Businesses

- Multifamily units
- Food service industry
- Retirement Homes / Nursing
- Hotels & Motels
- Wineries & Breweries
- Gymnasiums & Schools
- Food Processing



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Solar Thermal Target Markets

Commercial Pools	Universities	Multi-Family	Hotels	Single Family Homes
				
17	25	10.6	4.6	0.615

Average Metric Tons of CO^2 Saved per Year

Coin-op Laundries • Low Income • HOA's • Fitness Centers

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SINGLE FAMILY HOME

BENEFITS

Cut hot water costs by 70-80%

Lower CO^2 emissions by decreasing the energy needed to run your existing water heater

Long Life. Average system will last 25 years with proper maintenance

A lot of hot water! Systems come with additional storage for hot water

Very efficient! The system can even heat water in cloudy weather

FEATURES

One or Two Panel Systems

Drainback or glycol systems to prevent freezing issues

40, 80, 120 gallon solar storage tanks

Online monitoring available

Very efficient! The system can even heat water in cloudy weather

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Benefits to CA Rate Payers

INCENTIVES

- Federal Tax Credit (30% of Installed Cost)
- CSI Thermal Rebate (PG&E)
- Depreciation Tax Savings (Commercial Customers)
- Lower Utility Bills

FINANCING

- PACE Financing
- Local Bank Loans
- National Bank Loans
- Equipment Leasing

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CSI – Thermal Rebate Program

Major **Program Goals**

The CSI- Thermal Program provides incentives for customers that install solar thermal technology at their home, business, farm, etc. to offset natural gas consumption for certain types of water & air heating

- Significantly **increase the market size** of Solar Thermal in California
- **Reduce barriers** to adoption
  - high permitting costs
  - shortage of trained installers
  - lack of consumer knowledge
  - confidence in technology
- Drive **reductions in the cost** of Solar Thermal

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Incentive Budget

- **Total: $305,000,000**

  (Admin by: PG&E, SoCalGas, SCE, SDG&E/CSE)

  - **Natural Gas: $180M**
    - ✓ 60% Multi-Family/Commercial
    - ✓ 30% Solar Pools
    - ✓ 10% Single-Family Residential
  - **Low-Income: $ 25M**
  - **Electric:** $100.8M *funds exhausted*

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Attractive Incentives!

	Single-Family		Multi-Family/Commercial		
Step	General Market	Low-Income	General Market	Low-Income	Pools
1	**$29.85** Capped at: $4,366	**$36.90** Capped at: $5,397	**$20.19** Capped at: $800,000	**$24.89** Capped at: $800,000	**$5.00** Capped at: $500,000
2	$25.37 Capped at: $3,710	$32.42 Capped at: $4,741	$17.16 Capped at: $800,000	$21.86 Capped at: $800,000	$5.00 Capped at: $500,000
3	$14.30 Capped at: $2,091	$21.35 Capped at: $3,122	$10.15 Capped at: $800,000	$14.85 Capped at: $800,000	$4.00 Capped at: $500,000
4	$3.23 Capped at: $472	$10.28 Capped at: $1,503	$3.13 Capped at: $800,000	$7.83 Capped at: $800,000	$3.00 Capped at: $500,000

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Program Eligibility – Residential

- ✓ **Current PG&E Nat Gas customer**
- ✓ **Domestic Hot Water (DHW):**
  - Water used for domestic purposes.
    - Drinking
    - Food Preparation
    - Sanitation
    - Personal Hygiene

Water that goes down the drain…..

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Program Eligibility – M-Fam/Comm

- ✓ **Consumed End Uses:**
  - SWH applications that directly consume the solar heated potable water, as opposed to using the solar heated water as a medium to carry heat for some other end use. **PBI req.** >250kWth
- ✓ **Process Heat:**
  - Solar water heat that is transferred for another use; not directly consumed. For ex. Space heating, cooling, other processes. **PBI**
- ✓ **Commercial Combination Systems:**
  - Any combination of consumed and process heat end uses. **PBI**
- ✓ **Non-Residential Pools:**

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EXAMPLE SWH BUSINESS CASES

Single Family Homes

Installation	(2) 4' x 8' panels and 80 gallon storage tank	22° tilt, south facing, 100% sun
Installation Cost	$7,800	
30% Federal Tax Credit	($2,340)	
CSI Thermal Rebate	($4,366)	Step 1 incentive $29.85 per annual therm displaced
Net Cost	$1,094	
First Year Savings	$194	
Payback	4.9 years	$1.25 per therm and 155 therms saved per year, 5% escalation
Annual Reduction CO_2	0.615 metric tons	

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EXAMPLE SWH BUSINESS CASES

Hotel Hot Water for Rooms (200 rooms; est 15 gallons hot water per day per room)

Installation	(21) 4' x 10' collectors	22° tilt, south facing, 100% sun
Installation Cost	$162,245	
30% Federal Tax Credit	($48,674)	
CSI Thermal Rebate*	($67,717)	Step 1 incentive $20.19 per annual therm displaced
Tax on rebate	$29,687	
Depreciation Tax Savings	($60,972)	
Net Cost	$14,569	
First Year Savings	$3,346	
Payback	4.8 years	0.95 per therm and 3,354 therms saved per year, 5% escalation
Annual Reduction CO_2	864 metric tons	

Low-Income Apartment Building (97 apartment units)

Installation	(26) 4' x 10' collectors	22° tilt, south facing, 100% sun
Installation Cost	$182,725	
30% Federal Tax Credit	($0)	
CSI Thermal Rebate*	($106,479)	Step 1 incentive $24.89 per annual therm displaced
Net Cost	$76,246	
First Year Savings	$4,674	
Payback	12.2 years	$1.04 per therm and 4,278 therms saved per year, 5% escalation
Annual Reduction CO_2	1,102 metric tons	

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EXAMPLE SWH BUSINESS CASES

Apartment Pool (size: 400-450 s.f.)

Installation	(10) 4' x 12.5' collectors	22° tilt, south facing, 100% sun
Installation Cost	$11,350	
30% Federal Tax Credit	($0)	
CSI Thermal Rebate	($5,850)	Step 1 incentive $5.00 per annual therm displaced
Tax on rebate	$2,565	
Depreciation Tax Savings	($4,982)	5 Yr MACRS Fed, 12 Yr Straight Line State
Net Cost	$3,083	
First Year Savings	$1,535	
Payback	3.1 years	$1.25 per therm and 1,170 therms saved per year, 5% escalation
Annual Reduction CO_2	121 tons of CO^2	

Solar Thermal Design and Installation

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THANK YOU!